

**I. EXECUTIVE SUMMARY**

DWR WATERSHED

**a. Restoration of Riparian Forest and Shaded Riverine Habitats at Battle Creek Wildlife Area, Shasta County, California**

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California Department of Fish and Game  
Region 1, Natural Heritage Division

**b. Project Description and Primary Biological/Ecological Objectives**

The proposed project will restore approximately 20 acres of riparian forest on the Carr/Kohn unit of the Department's Battle Creek Wildlife Area. Located on the north bank of Battle Creek, the restoration site is entirely within the 100-year floodplain and supported riparian vegetation prior to being cleared for agricultural purposes during the last century. Soils and hydrologic processes remain intact at the site, but the vegetation is dominated by aggressive exotic weed species. The site currently provides only limited ecological services to the terrestrial and aquatic systems of Battle Creek.

The primary benefits that will result from the project are the restoration of a functioning riparian community along this portion of Battle Creek. The development of a riparian forest overstory will slow the movement of flood waters, allowing deposition of sediments and re-establishing channel and bank formation processes. The restored riparian forest will increase shaded riverine aquatic habitat and eventually provide a source for the recruitment of coarse woody debris to the channel. Resulting improvements in channel complexity, cover and rearing habitat will provide direct benefits to priority species that use Battle Creek for natural spawning. These include late-fall run chinook salmon, spring-run chinook salmon, and steelhead.

**c. Approach/Tasks/Schedule**

The restoration approach focuses on the re-establishment of riparian forest overstory vegetation at the project site. As the overstory becomes established, native riparian herbs and vines will invade the site naturally. Natural successional processes will be allowed to shape the structure and composition of the riparian forest following a 3-year plant establishment period.

Revegetation plantings will use native, locally obtained plant materials, primarily in the form of direct seeding and dormant stem cuttings. These plant materials have performed well in pilot plantings on the Tompkins unit of the wildlife area. Site preparation will begin in January, 1998. Planting is scheduled for late winter and early spring of 1998, with drip irrigation, weed control and browse protection provided for 3 growing seasons. The project will be completed in December, 2000.

**d. Justification for Project Funding by CALFED**

The stream reach below the barrier at the Coleman Hatchery is the only available habitat for natural spawners on Battle Creek and is heavily used by anadromous fish, including three of

the priority species identified in the Category III RFP. Shaded riverine aquatic habitat and riparian forest are priority habitats identified in the CALFED Ecosystem Restoration Program Plan. Restoration of these habitats at the project site will directly address stressors identified by CALFED technical teams including (1) loss of existing riparian zone, (2) water temperature, and (3) competition from introduced plants. Benefits to the aquatic and terrestrial system will be realized over a long-term period, 60 to 100 years.

**e. Budget Costs and Third Party Impacts**

Total project costs are estimated at \$254,607. The Department is proposing a cost share of \$79,383 based on the cost of land acquisition, irrigation water, and transportation to the site. The amount requested from CALFED is \$175,224. No adverse third party impacts are anticipated as a result of the restoration.

**f. Applicant Qualifications**

All members of the project team are experienced in restoration ecology. The co-project managers include the Assistant Lands Coordinator for Region 1 and the Vegetation Team Leader for the Cantara Damage Assessment and Restoration Program. These individuals bring a mix of skills to the project, including riparian revegetation techniques, irrigation design and maintenance, exotic pest plant control, project management, and extensive knowledge of the Battle Creek Wildlife Area.

**g. Monitoring and Data Evaluation**

The restoration site will be monitored annually for a minimum of three years following plant installation to insure performance goals for survival and establishment are being met. Target establishment goals for the project are 130 overstory trees per acre. Based on an initial planting density of 220 trees per acre, survival rates of 60% will need to be achieved at the end of the plant establishment period.

Monitoring at this site will be coordinated with ongoing riparian restoration activities at the Battle Creek Wildlife Area, including mitigation bank plantings on the Tompkins parcel approximately 1.5 miles downstream. These two sites provide a unique opportunity to compare the performance of plantings on different soils and landforms along Battle Creek.

**h. Compatibility with CALFED Objectives**

This project is fully compatible with CALFED objectives as described in the Category III RFP and the vision for riparian and riverine aquatic habitats in the Ecosystem Restoration Program Plan. Restoration of riparian forest vegetation on the project site is a critical first step in reactivating natural physical processes within the Battle Creek floodplain.

## **II. TITLE PAGE**

**Project Title:** Restoration of Riparian Forest and Shaded Riverine Aquatic Habitats at Battle Creek Wildlife Area, Shasta County, California

**Applicant:** California Department of Fish and Game  
Region 1, Natural Heritage Division  
601 Locust Street  
Redding, California 96001

**Principal Investigator:** Mr. James R. Nelson  
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**Organization:** State Agency

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**Participants:** Department of Fish and Game, Region 1

**Project Type:** Group 3: Services

### III. PROJECT DESCRIPTION

#### a. Project Description and Approach

The proposed project will result in the restoration of approximately 20 acres of Mixed Riparian Forest (Fremont cottonwood series) and Valley Oak Riparian Forest (Valley oak series) on the Carr/Kohn unit of the Department's Battle Creek Wildlife Area. Restoration plans call for the establishment of overstory trees including Fremont cottonwood, black willow, Oregon ash and California sycamore adjacent to the active channel of Battle Creek. At higher elevations on the stream terrace, plantings will emphasize valley oak, sycamore, blue elderberry and black walnut. Additional black willow will also be planted to in an effort to link existing seasonal wetlands within the floodplain to the riparian corridor.

Located on the north bank of Battle Creek, the project is entirely within the 100-year floodplain on Molinos sandy and fine sandy loams. These soils historically supported a dense riparian forest of Fremont cottonwood, California sycamore, Oregon ash, black willow, and valley oak before being cleared for agricultural purposes in the last century. Although the native vegetation has been removed, the physical components of the habitat remain intact at the project site. The site has not been leveled, and both soils and hydrology appear suitable for woody riparian vegetation.

The restoration approach focuses on the re-establishment of riparian overstory vegetation at the project site. As the overstory becomes established, native riparian understory herbs and vines will invade the site naturally. While the abiotic components of the site are suitable, cattle grazing, competition from perennial weeds and browsing pressure from the local deer population have allowed only limited colonization and establishment of woody riparian species. This project will use techniques that have been successfully applied at similar sites to reduce competition from weeds and herbivores to establish native riparian tree and shrub species.

Prior to planting, weeds will be controlled using both physical and chemical methods. Control efforts will focus on the most aggressive or invasive species, including Himalayan blackberry (*Rubus discolor*), Johnsongrass (*Sorghum halepense*), yellow star-thistle (*Centaurea solstitialis*), and scouring-rush (*Equisetum* sp.). Blackberries will be controlled by cutting the canes to the ground in the late fall, followed by an application of Garlon when resprouts emerge in the early spring. Control of the other weedy taxa will require carefully timed herbicide applications during the growing season. Following initial control efforts, the planting area will be periodically mowed to keep weed populations suppressed.

Planting will occur in late winter and early spring, using a combination of stem cuttings, direct seeding, and 1-gallon container plants. All plant materials used in revegetation will be locally adapted, native species collected from the project area. Fremont cottonwood, black willow, arroyo willow and narrowleaved willow will be planted as dormant stem cuttings in early February. Valley oak acorns and black walnuts will be collected in September/October and

direct seeded in late fall or early winter. California sycamore, white alder, and Oregon ash will be propagated from seed, while blue elderberry will be propagated from cuttings. These materials will be outplanted as 1-gallon container stock. All plantings will receive temporary irrigation, weed control and protection from herbivores during a three year plant establishment period. Drip irrigation will be used to apply water in pulses, allowing the surface soils to become dry prior to the next application. This method is designed to "train" plant roots to follow the water as it moves downward in the soil column. After one or two seasons of irrigation, plants reach the natural water table and no longer require supplemental watering. Following successful plant establishment, further development of the site will be left to natural successional processes associated with changes in the Battle Creek flood plain.

**b. Project Location and Geographic Boundaries**

The Battle Creek Wildlife Area is located in Shasta and Tehama Counties at the northern end of the Sacramento Valley, about 140 miles north of the City of Sacramento and 30 miles southeast of the City of Redding (Figure 1). The wildlife area consists of 466 acres on both sides of Battle Creek, approximately 4 miles above its confluence with the Sacramento River, and just downstream from the Coleman National Fish Hatchery. As described in the 1997 Category III RFP, the project is located in the North Sacramento Valley Ecological Unit.

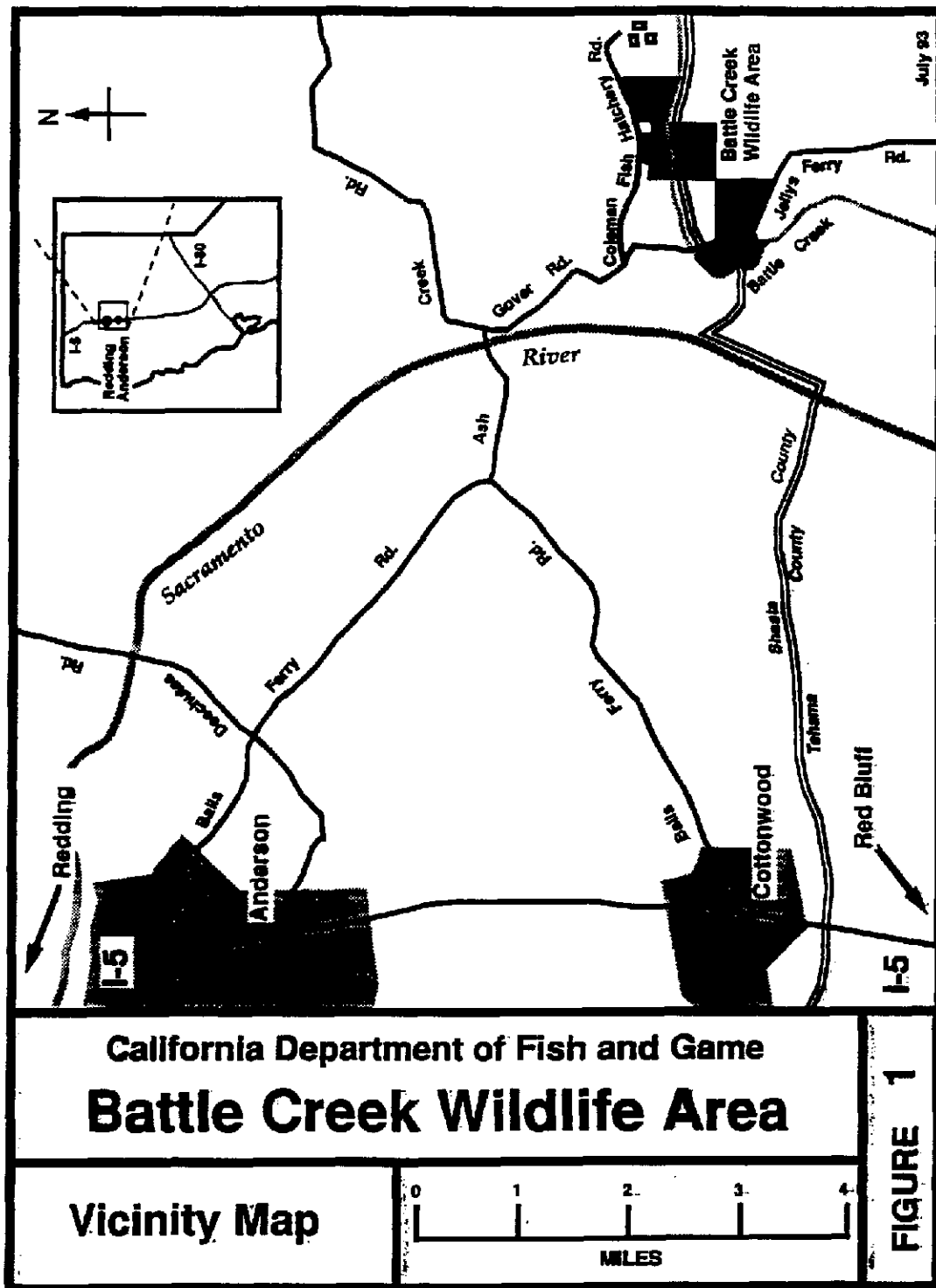
The restoration site itself is located on the north side of Battle Creek on the Carr/Kohn unit of the wildlife area. The active channel of Battle Creek forms the southern boundary of the restoration area, while the northern boundary is formed by existing seasonal wetlands and the Carr/Kohn irrigation ditch. Intact riparian forest forms the upstream and downstream boundaries of the planting area. The proposed restoration site is shown in detail in Figure 2.

**c. Expected Benefits**

The stream reach below the barrier at the Coleman Hatchery is the only currently available habitat for natural spawners on Battle Creek and is heavily used by anadromous fish, primarily fall-run chinook salmon. In addition, several of the priority species identified in the Category III RFP use this section of stream including late-fall run chinook salmon, steelhead, and limited numbers of spring-run chinook salmon. Battle Creek may become more important for spring-run fish if a means is found to allow access to habitat in the upper reaches above Coleman.

Restoration of riparian forest and shaded riverine aquatic habitats at the project site will provide a variety of ecosystem-level benefits within the lower Battle Creek riparian zone by directly addressing three of the stressors identified by CALFED technical teams. These include:

- Loss of Existing Riparian Zone
- Water Temperature, and
- Competition from Introduced Plants



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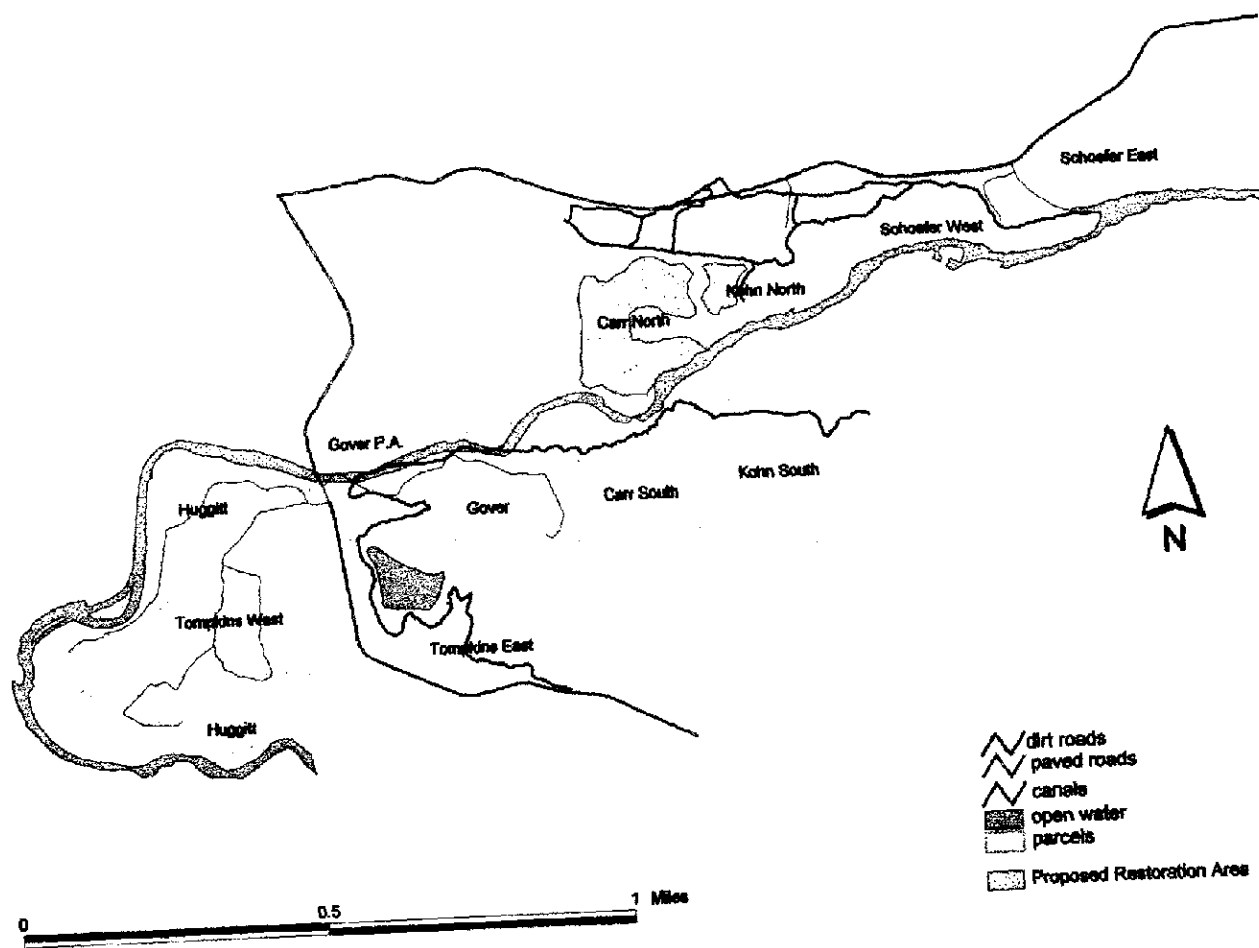


Figure 2. Riparian Forest Restoration Area, Battle Creek Wildlife Area Parcel.

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Re-establishing a riparian forest overstory at this location will improve aquatic conditions in the stream through increasing bank stability, creating overhanging vegetation to provide shade and reduce water temperatures, and ultimately providing a source for the recruitment of coarse woody debris to the stream channel. Reduced water temperatures, improved vegetative cover along the banks, and increased channel complexity resulting from downed riparian trees will collectively improve spawning and especially rearing habitat for priority species that utilize this reach of Battle Creek.

In addition to aquatic benefits, the project will also provide direct, quantifiable benefits to the terrestrial system and riparian dependent wildlife. Establishment of 20 acres of mixed riparian forest at this location will fill a gap in the current riparian vegetation along Battle Creek, creating a more continuous corridor and facilitating wildlife movement along the stream. In particular, the project will provide greatly improved habitat for both resident and migratory bird species, ranging from warblers to osprey and great blue herons.

**d. Background and Biological/Technical Justification**

Currently the project site is in a state of old-field succession following previous disturbance for dryland farming and grazing. The dominant vegetation consists of a dense cover of aggressive weeds including Himalayan blackberry, Johnsongrass, yellow star-thistle and scouring-rush. This dense cover provides a poor establishment environment for native riparian plant species. Although the site is still subject to fluvial processes associated with overbank flooding, the current herbaceous vegetation does little to slow flood waters or promote the deposition of sediments which might otherwise provide a suitable germination and establishment environment for riparian trees.

Over time, the site would likely progress toward a mixed riparian forest. However, without intervention, this transition would occur over a very long time period. This is particularly true since the site is above the active channel of Battle Creek and is not subject to annual inundation. Successful plant establishment would likely occur only in extremely favorable water years. By short-cutting the plant establishment phase, the benefits of a riparian forest overstory can be achieved on the site in a much shorter time frame. This approach has been used to successfully restore riparian forest vegetation in a number of similar high terrace settings. These include The Nature Conservancy's efforts at Kopta Slough and Stony Creek, and more recently, valley oak riparian forest plantings at the Redding Arboretum and the Sacramento River Discovery Center.

Once riparian tree species have been established on the site, benefits should accrue over a long period of time. Because most of the planting site is above the active channel, the risk of catastrophic loss due to scour and channel migration associated with high flow events is greatly reduced. As the forest vegetation matures, it will begin to influence fluvial processes by slowing flood waters and causing sediments to drop out on the terrace. Natural successional processes



associated with high flows, wind throw, recruitment and mortality will be allowed to shape the structure and composition of the forest following initial plant establishment. Given the relatively long life spans of the dominant tree species, ecosystem benefits should be realized for a period of at least 60 to 100 years.

**e. Proposed Scope of Work**

The proposed restoration project can be broken into six more or less discreet tasks for the purposes of project scheduling and cost estimation. Tasks 1 through 5 are briefly described in the following paragraphs. Task 6, Monitoring and Evaluation, is discussed in paragraph "f" of this section.

**Site Investigation and Planting Design.** Initial site survey work will include an investigation of soil depth and characteristics to identify potential limiting factors for plant growth. These may include compacted layers or gravel lenses in the profile that would limit root penetration. In addition, ground water observation wells will be installed to monitor changes in surface elevations during the growing season. Cultural resource and special-status plant and animal surveys will also be conducted during this phase to identify potential constraints within the revegetation site.

**Site Preparation.** Activities during this phase will focus primarily on controlling competition from weeds. A variety of chemical and mechanical control measures will be evaluated for use at the project site. It is anticipated that mowing, disking, and herbicide applications will be needed to provide initial control prior to planting. All herbicide applications will adhere to DFG policy/procedures and California Department of Pesticide Regulation rules and regulations.

**Install Irrigation System.** Supplemental irrigation will be required until plant root systems reach ground water. A temporary irrigation system will be installed prior to planting the site and will be maintained for at least three and probably no more than five years. A drip irrigation system will be used to deliver water to the majority of the restoration plantings. Three acres can be economically flood irrigated. The remaining 17 acres will be drip irrigated.

A gas or diesel pump will be used to move water from the Carr/Kohn irrigation ditch or from Battle Creek to the drip system. Filtration of water on this system will be necessary. A disk filter will handle debris of all sizes but will require regular maintenance to keep clean. All of the irrigation piping can be left above ground as there will be very little disturbance of the site other than by DFG personnel.

**Plant Propagation and Installation** All plant materials will be collected within the lower reaches of Battle Creek or along the Sacramento River in the immediate project vicinity. Seed, acorns, and dormant cuttings will be collected by Department staff during fall and early winter of 1997/98. Based on recent experience on the Tompkins parcel, direct seeding and

dormant stem cuttings will be the primary materials used in the restoration planting. Valley oaks, California buckeye, and black walnut will be planted from seed. Black willow, Fremont cottonwood, arroyo willow, and narrowleaved willow will be planted as dormant stem cuttings. Seed will be collected from Oregon ash, white alder, and California sycamore. These species will be contract grown as 1-gallon planting stock.

Planting will occur in late winter and early spring 1998 using labor provided by inmate crews. All plantings will be supervised by Department staff. If soils on the site are found to contain lenses of cobble, clay or compacted gravels, planting holes will be excavated with a power auger to facilitate root penetration. Weed control mats or mulch will be applied following plant installation to help suppress weed growth in the planting basins.

**Plant Establishment.** A three year plant establishment period is proposed to insure the plantings become self-sustaining. During this period, work will focus on irrigation, weed control, and minimizing damage from herbivores. The irrigation system will require frequent monitoring for proper function throughout its season of operation.

Weed control will require an active plan to prevent weeds from outcompeting the newly established riparian plants. Weed control will also be necessary to prevent damage to seedlings or young plants from catastrophic wildfire. Several weed control methods will be used in various combinations and include herbicide application, mowing, tilling or hand weeding, placement of weed mats and/or mulch.

Deer and rodent grazing will need to be monitored closely as this could easily wipe out such a small planting zone in a short time. Protection will be accomplished using screen or plastic tubes placed over the plants. As plants grow, larger metal cages can be used.

**f. Monitoring and Data Evaluation**

Restoration plantings will be monitored annually for a period of three years following installation to insure that performance goals for survival and establishment are being met. Target establishment goals for the project are 130 overstory trees per acre. Based on an initial planting density of 220 trees per acre, survival rates of 60% will need to be achieved at the end of the plant establishment period. Monitoring during this period will focus on plant survival and growth, but will also include evaluations of water table elevations during the growing season, soil moisture levels after irrigation, effectiveness of weed control measures, and patterns of herbivore damage. These factors will provide information that will be used to adaptively manage site maintenance during the plant establishment period. Following plant establishment, monitoring will continue at a reduced level. Post establishment monitoring will utilize permanent photo points and fixed plots to document the development of the riparian forest community over a 10-year period.

A monitoring plan will be prepared prior to planting the site. Because of the size of the

planting, it will not be possible to monitor all of the plants on the site. A stratified-random study design will be used to select sample plots that are representative of conditions across the restoration site. Standard statistical methods will be used to determine adequate sample sizes. Paired plot designs may also be used to evaluate the comparative effectiveness of different planting stock types or animal damage prevention devices. The purpose of these efforts would be to guide future restoration work at this site and others.

Monitoring at this site will be coordinated with ongoing riparian restoration activities at the Battle Creek Wildlife Area, including mitigation bank plantings on the Tompkins parcel approximately 1.5 miles downstream. These two sites provide a unique opportunity to compare the performance of plantings on different soils and landforms along Battle Creek.

**g. Implementability**

Battle Creek Wildlife Area was acquired to protect, enhance, and develop riparian and wetland habitats, and to protect and enhance habitat for salmon and steelhead. The current restoration proposal is fully consistent with the goals and objectives identified in the **Battle Creek Wildlife Area Draft Management Plan**. The Department has riparian and pre-1914 appropriative water rights, including a 63% interest in water from the Carr/Kohn irrigation ditch.

Minor alterations to land for the purposes of enhancing fish and wildlife habitat are categorically exempt from the California Environmental Quality Act (CEQA) under Section 15304(d) of the CEQA Guidelines. However, the Department will conduct an environmental review of the site to insure that resources are not inadvertently damaged during the restoration process. This review will include surveys to identify cultural resources and special-status plant or animal species that may exist on the site. All herbicide applications will adhere to Department policy/procedures and California Department of Pesticide Regulation requirements.

**IV. COSTS AND SCHEDULE FOR PROJECT IMPLEMENTATION**

**a. Budget Costs**

An estimate of the costs required to accomplish the project is shown in Table 1. The total funding requested from CALFED is \$175,224. This includes planning, implementation, monitoring, and a three-year plant establishment period. Also included is a 10 percent contingency based on the total estimated cost of tasks 3 and 4. This amount is reserved for replacement plantings and/or repair of the irrigation system in the event of damage caused by an extreme high flow event during the plant establishment period. Based on the performance of the restoration site during high flows in March 1995 and January 1997, the risk of catastrophic loss from flooding is considered to be low.

A cost share in the amount of \$79,383 is included in the budget. This figure includes the acquisition cost of the 20-acre restoration site, the cost of irrigation water delivered to the site

Table 1. Budget Estimate Broken Down by Project Tasks

Project Task Description	Direct Labor Hours	Direct Salary and Benefits	Service Contracts	Other Direct Costs	Total Direct Costs	Cost Share
<b>1. Site Investigation/Planting Design</b>						
Property Acquisition						\$46,960
Cultural Resources Survey	40	\$484		\$100	\$594	
Soils Investigation	48	\$1,474		\$250	\$1,724	
Initial Study	40	\$1,354			\$1,354	
Planting Plan	60	\$1,852			\$1,852	
Travel (400 miles @ .24)						\$96
<b>Subtotal Task 1:</b>					<b>\$5,524</b>	<b>\$47,056</b>
<b>2. Site Preparation</b>						
Herbicide Application	60	\$1,652		\$1,000	\$2,852	
Mowing and Discing	32	\$881		\$1,600	\$2,481	
Travel (280 miles @ .24)						\$67
<b>Subtotal Task 2:</b>					<b>\$5,134</b>	<b>\$67</b>
<b>3. Install Drip Irrigation System</b>			\$24,000 <sup>1</sup>		\$24,000	
Water Costs						\$28,680
<b>Subtotal Task 3:</b>					<b>\$24,000</b>	<b>\$28,680</b>
<b>4. Planting</b>						
Collect Plant Materials	120	\$3,028			\$3,028	
Plant Propagation			\$7,500 <sup>2</sup>		\$7,500	
Installation	1200	\$19,260		\$825	\$20,085	
Travel (1800 miles @ .24)						\$432
<b>Subtotal Task 4:</b>					<b>\$30,813</b>	<b>\$432</b>
<b>5. Plant Establishment (3 years)</b>						
Weeding, Irrigation, Fencing	4159	\$51,364		\$14,652 <sup>3</sup>	\$66,016	
Travel (12000 miles @ .24)						\$2,880
<b>Subtotal Task 5:</b>					<b>\$66,016</b>	<b>\$2,880</b>
<b>6. Monitoring &amp; Evaluation (3 years)</b>						
Data Collection	240	\$5,777		\$250	\$6,027	
Report Preparation	180	\$4,472			\$4,472	
Travel (1200 miles @ .24)						\$288
<b>Subtotal Task 6:</b>					<b>\$10,499</b>	<b>\$288</b>
<b>7. Contingency @ 10% Tasks 3 &amp; 4:</b>					<b>\$5,461</b>	
<b>Subtotal Direct Costs:</b>					<b>\$147,247</b>	
<b>8. Departmental Overhead @ 19%:</b>					<b>\$27,977</b>	
<b>9. Total CALFED Funds Requested:</b>					<b>\$175,224</b>	<b>\$79,383</b>

<sup>1</sup> Lump sum estimate to install irrigation system, pump and filter on site.

<sup>2</sup> Lump sum estimate to propagate 1-gallon plants from seed and cuttings.

<sup>3</sup> Plant protection cages.

over the three year plant establishment period, and all transportation costs to the site over the life of the project.

**b. Schedule Milestones**

A schedule for major project tasks is shown in Table 2. The actual schedule will depend upon the length of time required to complete a contract agreement for the proposed work. For estimation purposes, the schedule in Table 2 assumes that a contract will be in place by January 1, 1998. Delay in the project start date will result in changes in the project schedule. In particular, if authorization to begin work is delayed beyond mid-February, the spring planting window will be missed. This would delay the start of the project until Fall 1998. Other time sensitive activities include collection of seed and acorns. Acorns are best collected in October-November before they drop from the trees. Because acorn crops vary dramatically from year to year, it may be necessary to collect seed for the project in advance of project approval if 1997 is a good mast year. Acorns will be harvested in the fall of 1997 in conjunction with ongoing collection activities for the Department's riparian plantings on the Tompkins parcel.

Payments can be scheduled upon completion of major project tasks. The following schedule is proposed:

<u>Work Item</u>	<u>Estimated Completion Date</u>
Tasks 1, 2, and 3	March 31, 1998
Task 4 (Direct seeding and cuttings)	March 31, 1998
Task 4 (1-gallon container stock)	March 31, 1999
Tasks 5 and 6 (Year 1)	December 15, 1998
Tasks 5 and 6 (Year 2)	December 15, 1999
Tasks 5 and 6 (Year 3)	December 15, 2000

**c. Third Party Impacts**

No third party impacts are anticipated as a result of the proposed project.

**V. APPLICANT QUALIFICATIONS**

The project team assembled for this restoration effort consists of a principal investigator, two co-project managers, a restoration ecologist, a plant ecologist, and support staff at the scientific aide level. Mr. James R. Nelson will be the principal investigator for the project. He will oversee all aspects of the program and will be responsible for quality control and quality assurance in the design and implementation of the restoration.

Table 2. Project Schedule

	1998	1999	2000
<b><u>Project Work Items</u></b>	<b><u>JFMAMJJASOND</u></b>	<b><u>JFMAMJJASOND</u></b>	<b><u>JFMAMJJASOND</u></b>
Cultural Resource Survey	X		
Soils Investigation	X		
Initial Study/Categorical Exemption	XX		
Planting Plan	XX		
Herbicide Application	X X X		
Mowing/Discing for Site Preparation	X		
Install Irrigation System	XX		
Collect Plant Materials	XXX		
Plant Propagation	XXXXXXXXXXXXXXXXX	X	
Plant Installation	XX	XX	
Weeding, Irrigation, Plant Protection	XXXXXXX	XXXXXXX	XXXXXXX
Collect Monitoring Data	XX	XX	XX
Monitoring Reports		X	X

Mr. Craig P. Martz and Mr. Steven J. Arrison will serve as co-managers for the project. While each will have different areas of responsibility, they will work closely to address restoration issues on the site as well as handle project administration. Mr. Martz will be responsible for plant material collection, propagation, installation, and monitoring phases of the project. Mr. Arrison will oversee the site preparation, irrigation, exotic removal, and animal damage control aspects of the effort. Both will collaborate in the preliminary site investigation and restoration design phases.

Mr. Stephen Bachman and Dr. Richard A. Lis will provide technical expertise and guidance in all phases of the project. In particular, they will prepare the planting plan for the site and develop the vegetation monitoring and evaluation protocol for the project. Daily maintenance and inspection of the irrigation system, mowing, weed control, and plant protection during the plant establishment period will be accomplished by scientific aides.

Brief biographical descriptions for the members of the team are included below:

**James R. Nelson, Principal Investigator**  
Natural Heritage Supervisor

Education:

M.A. Degree in Biological Resource Planning. California State University, Chico

Experience:

A professional biologist with over eighteen years experience with the State of California, Mr. Nelson currently supervises staff working on several programs serving an eight county area of northern California. Included in his responsibilities is the Lands Program which oversees the management of Ecological Reserves and several Wildlife Areas. The Battle Creek Wildlife Area is one of the Department facilities managed by his unit.

Relevant Experience:

Mr. Nelson has worked actively on riparian conservation and restoration efforts since 1976 when he served as the plant ecologist on a team of students who mapped riparian habitat throughout the central valley on contract to the Department of Fish and Game. He remains active in habitat conservation efforts and has participated in a wide variety of successful efforts to protect wetland resources including the Sacramento River stream corridor protection program.

**Craig P. Martz, Co-Project Manager**  
Plant Ecologist

Education:

B.S. Degree in Conservation of Natural Resources. University of California, Berkeley.

Experience:

Seventeen years experience in botany, including inventories, conservation and

management of special-status plant species, wetland and riparian restoration, mitigation planning.

**Relevant Experience:**

Six years as the Vegetation Team Leader for the Cantara Natural Resource Damage Assessment and Restoration Program. Responsible for restoration of damaged riparian vegetation along the upper Sacramento River. Currently managing Cantara Trustee Council riparian restoration grant project on the upper Scott River.

**Steven J. Arrison, Co-Project Manager**

Associate Biologist (Wildlife)

**Education:**

B.S. Degree in Wildlife Management from California State University, Humboldt.

**Experience:**

Ten years experience in unstaffed DFG lands management in Region 1 involving issues of site security, public health and safety, resource management, infrastructure and use management.

**Relevant Experience:**

Supervised the planning, writing and implementation of the Riparian Habitat Development Plan for the Battle Creek Riparian Conservation Bank and the Battle Creek Wildlife Area Exotic Pest Plant Control Operational Plan.

**Mr. Stephen J. Bachman, Restoration Ecologist**

**Education:**

B.A. Degree in Environmental Sciences. University of California, Santa Cruz.

**Experience:**

Seven years experience in restoration of native plant communities in central and northern California. Collected seed, propagated native plants, monitored results for dune restoration at Asilomar State Beach. Coordinated major subalpine meadow restoration on Mt. Shasta.

**Relevant Experience:**

Supervised installation and operation of USFS greenhouse facility in Mt. Shasta. Responsible for propagation of native plant materials for riparian and wet meadow restoration. Installed, maintained and monitored riparian plantings along the upper Sacramento River following the Cantara Loop spill.

**Dr. Richard A. Lis, Plant Ecologist**

**Education:**

Ph.D. Degree in Botany. University of California, Berkeley



**Experience:**

Six years experience in the inventory of special-status plants and plant communities, design and implementation of monitoring programs for revegetation projects following construction of natural gas pipeline and transmission line projects.

**Relevant Experience:**

Responsible for preparation of the Riparian Habitat Development Plan for the Battle Creek Riparian Conservation Bank and the Battle Creek Wildlife Area Exotic Pest Plant Control Operational Plan.

**Scientific Aide Position**

**Knowledge in:**

Equipment operation, irrigation systems, native plant species identification, weed control methods, plant protection methods and growth rates, general health, etc. of native plant species.

**Experience in:**

Operation of equipment, herbicide application, collection of native plant seed and cuttings, planting of seeds, cuttings and container stock, installation and maintenance of drip irrigation systems, installation of grazing protection devices.

**VI. COMPLIANCE WITH STANDARD TERMS AND CONDITIONS**

The standard clauses and contract requirements listed for State Agencies in Attachment D of the RFP have been reviewed and are acceptable to the Department.